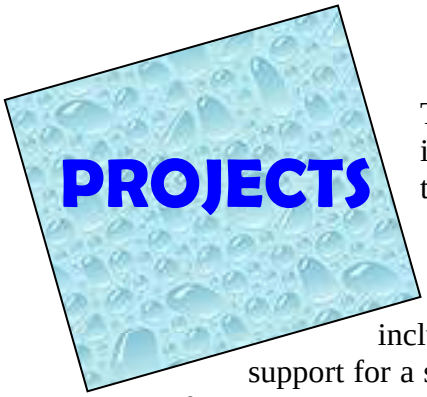
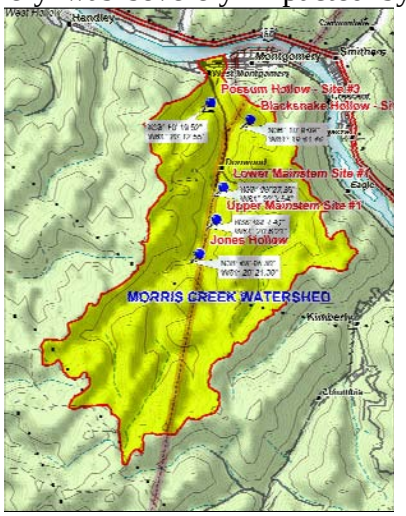


The other focus of the NPSP is to implement projects intended to reduce nonpoint source pollution. Most of these projects are part of a TMDL implementation plan and are funded by S319 incremental funds. However, some projects are from S319 base funds and may not be a part of a TMDL implementation plan. In 2006 these projects included a logging demonstration and research project and support for a stream bank restoration project in a non-TMDL watershed.

The following projects, active in 2006, are listed by the project watershed, the TMDL they are a part of (if applicable) and the stream code.

Morris Creek – Upper Kanawha TMDL – WVK-70

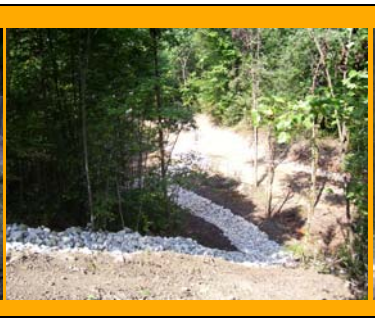
The Morris Creek AMD project located near Montgomery was severely impacted by dozens of deep mine portals and passages scattered throughout the watershed. Morris Creek and its tributaries have low pH (from 3.3 to 7.1) moderate acidity (81-246 mg/L as CaCO3) and very little alkalinity. Four abandoned coal mine discharges were identified and targeted for acid mine drainage treatment. The sites were called Black Snake Hollow, Opossum Hollow, Upper Mainstem Site and Lower Mainstem Site. Laboratory analysis of samples collected from these sites indicate mean pH values as follows: Oppossum Hollow 5.94, Black Snake Hollow 2.92, Lower Mainstem, 3.39, Upper Mainstem 3.27. Baseline data for the TMDL showed that Morris Creek had metal loads of: aluminum 8531 lbs/yr, iron 3173 lbs/yr and manganese 6548 lbs/yr.

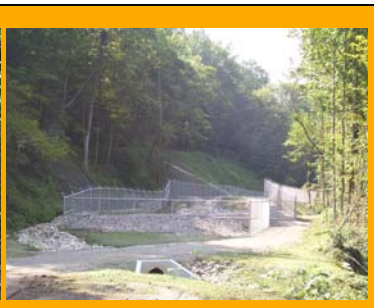


All four sites were constructed in 2006 and each site had different construction challenges. Opossum Hollow design was a passive treatment using an aerobic wetland, a small finishing pond, and a manganese removal bed or horizontal flow bed. Water will first be captured on site then alkalinity will be titrated using the aerobic wetland. Metals precipitation will occur through uptake by wetland and captured by a polishing pond. At Black Snake Hollow because of the steepness an OLC with check dams was used. At the Lower Mainstem Site a passive treatment utilizing an anaerobic wetland, two polishing ponds, and a horizontal flow manganese removal bed was constructed. Treatment involved boosting the pH of the inflow of good water to titrate bad water coming from the discharge. The high pH water will drop the metals out of solution to be captured by the polishing ponds. The Upper Mainstem Site was a major passive treatment system. The creek was rerouted through a large limestone channel for treatment to boost the pH of the inflow of good water to titrate bad water coming from

the discharge. Limestone leach beds treat the portal discharges. Qualified water quality data has not been collected yet.

The Upper Mainstem Site Construction: Morris Creek was rerouted through a large OLC to add alkalinity and separate it from portal discharges on the left. The construction showed that the entire valley bottom had been covered with coal mine refuse.





Possum Hollow Site Blacksnake Hollow Site Lower Mainstem Site

Dramatic Results from the Upper Mainstem Site: Looking downstream, acidic discharge from the portals on the right goes through limestone treatment with check dams. It then joins the alkaline boosted water from the OLC. Iron and aluminum quickly drop out and the pH below the mixing zone was field tested at 6.0. Sampling by a WVU Tech class has shown an improvement in pH from 5.6 to 7.0

An unexpected benefit: Wildlife habitat enhancement. Evidently large limestone rocks make excellent rattlesnake dens, they moved in quickly. Also: possible added security to protect the project.

Surveying and designs were developed for the stream bank stabilization projects so construction can begin in the spring of 2007. The Morris Creek Watershed Association (MCWA) has been a major partner in the projects in their watershed. They have been persistent in their efforts to install restoration projects, they have assisted state agencies in implementing those projects and they have recruited more stakeholders to participate in the project team. In recognition of their contributions the MCWA won the Watershed Association of the Year award at this year's Watershed Celebration Day.

Little Sandy Creek – Lower Elk River TMDL – WVKE-9

The Little Sandy Creek watershed has been the watershed of focus from the Lower Elk WBP. There are three nonpoint source categories the Project Team is focusing on. They are failing septic systems, oil and gas roads and stream bank restorations. The TMDL calls for reductions in metals but the source is from sediment not AMD. Fecal contamination from failing septic systems is also a problem.

The WVDEP, OO&G has mapped and collected information on the oil and gas roads throughout the entire watershed. The Wills Creek subwatershed was selected for a demonstration project due to the large concentration of oil and gas and roads in the area. North Coast Energy, the landowner, has partnered with the agency to improve a section of road as a demonstration project. Geotextile, gravel, rock and culvert have been purchased and delivered to the landowner. The company has hired a contractor work to replace old existing culverts, add additional drainage, armor culvert outfalls and stone the road, which started near the end of September.

The Natural Stream Restoration demonstration project at Little Sandy Creek Park was completed in August 2006. Nearly 500 feet of eroding stream bank was restored and structures to help move sediment and provide habitat were installed. Erosion control matting was placed and approximately 400 tree stakes were planted along with native grasses. The NPSP, the Little Sandy Creek Watershed Association and volunteers from West Virginia American Water did the plantings. The Non-Point Source program will team with the Little Sandy Creek Watershed Association in spring 2007 to make additional park improvements including informational kiosks about the watershed association and Natural Stream Restoration. A S319 FY 2006 grant will fund a watershed wide assessment to prioritize future natural stream bank restoration projects.

Left: Ben Walls of DEP supervises installation of rock veins. *Middle:* the Southern Conservation District workers using a long arm shovel to place the rocks. *Right:* volunteers plant willow stakes along the new banks.

The Little Sandy Creek Watershed Sewage Survey, which was conducted by the Kanawha County Health Department (KCHD) has been completed. This was an aggressive effort by the county health field sanitarians to visit every home in the watershed to determine the status of sewage disposal facilities for each individual home. 664 homes were visited, with access being gained at many residences to perform dye testing. Failures were observed at 215 residences, without a dye test. Overall, 42% of all residences evaluated were determined to have either no septic system, (straight pipe), or, a failing septic system (sewage surfacing on the ground surface).

Some surprising things were scooped out of Little Sandy Creek during the project.

Currently in the Little Sandy Creek Watershed, DHHR is working with WVDEP personnel in evaluating the locations, and relative proximities of failures noted in the report. This is being done based on the detailed mapping of the survey project provided by the KCHD. The ongoing effort is to locate areas where multiple dwellings could efficiently be served by "cluster" sewage collection with an adjacent area available for in-ground disposal.

Little Grave Creek – No TMDL – WVO-85

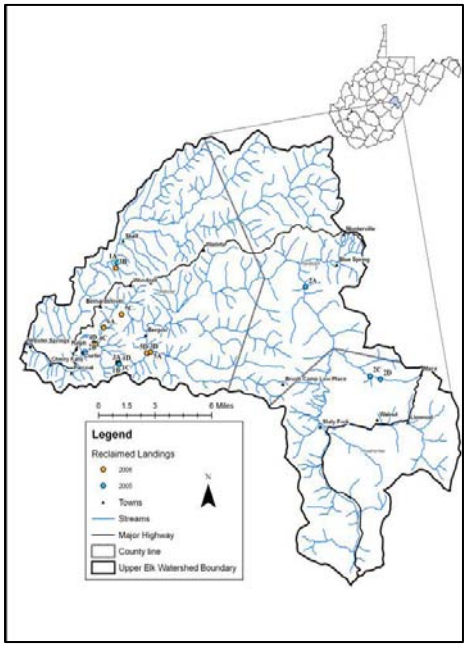
Little Grave Creek is a 16 square mile direct drain of the Ohio River located in the Upper Ohio South sub-watershed. The land use on the hilltops is forestland, farmland and small communities. The steep mid-slopes are mostly forested with some logging. The land use on the flats adjacent to Little Grave Creek and its sub-tributaries is urban, sub-urban, forestland and agricultural (mostly pasture and hay production). Three devastating floods in 2004-2005 coupled with land use caused extreme stream bank erosion to sections of Little Grave Creek. These projects were supported by $25,000 of S319 base grantfunds.

A project team was formed including the WVCA, the WVDEP, the Northern Panhandle Conservation District and the Canaan Valley Institute. It was determined that the best solution to the sediment problem was a series of Natural Stream Channel Design (NSCD) projects.

The first project was completed in March 2006. It included a 150 ft. bankfull bench and two rockvane-jhooks. Later 52 volunteers organized by the Little Grave Creek Watershed association planted 1,000 trees as part of a riparian buffer improvement project. The estimated sediment load reductions are 9.1 tons of sediment per year.

A second project restoring 1550 feet of eroding stream banks was completed in August. A total of 13 structures of both log and rock were installed and banks were sloped to a 2:1 slope. Finally the disturbed area was seeded and mulched. Estimated load reductions from this project are 32.8 t/y of sediment.

Vigorous Establishment of Native Vegetation on Landings and Skid Roads - Upper Elk River – No TMDL – WVKE



Research was conducted in the Upper Elk River Watershed by the WVU Appalachian Hardwood Center. This S319 funded research focused on logging operations landings and forest roads as the largest potential source for sedimentation from logging operations. The watershed is a high-quality coldwater system with 16 streams listed on the 303(d) list. Erosion from skid trails and landings is often intensified by the compacted nature of the soils following timber harvest. Compacted soils in areas frequented by logging equipment results in a poor seedbed for the establishment of vegetation following harvest. Further, seed mixtures used for reclamation are composed of non-native seeds. The establishment of native vegetation on skid roads and landings not only controls sedimentation, but it also provides nesting, feeding, and escape habitat for wildlife and promotes healthy, native plant diversity in watershed forests.

WVU Appalachian Hardwood Center developed a program to recruit landowners in the Upper Elk Watershed for participation in this research project. Brochures were developed to describe the project and its objectives, and mailed out to landowners in the Upper Elk Watershed. Additionally, representatives from the several timber companies were visited to discuss the project and recruit them for participation.

Landing preparations included soil scarification using a modified ripper-tooth dozer-blade assembly and plantings of native seed mixtures. The modified ripper-tooth dozer-blade assembly was developed to turn up the soil on landings and create better seed to soil contact than is created by traditional dozer blade dragging of landings before planting. The assembly can be hydraulically fitted onto any dozer and requires no extra modifications to the dozer blade for use.

WVU developed 3 native seed mixtures for this project based on 3 specific enhancement criteria, and compared them to a fourth non-native mixture used currently by timber companies for reclamation on 12 landings. Each mixture reduced different amounts of sediments. Sediment reductions were 85.74 % for the traditional mixture, 75.73 % for the wildlife mixture, 43.71 % for the stabilization mixture, and 27.59 % for the wildflower mixture. These data suggest that a 68 % average reduction in the amount of sediments moving on landings that were vegetated versus those without vegetation establishment.

Road sections with no fiber mulch or seeding averaged 22,999.72 lbs/ac/yr of sediment compared to those with fiber mulch and seeding averaged 2631.94 lbs/ac/yr. The planting of native vegetation and use of fiber mats accounted for an averaged 86% reduction in the amount of sediments in the Upper Elk River watershed.

Embankments with no vegetation averaged 26,043.33 lbs/ac, those with traditional vegetation averaged 10,635.55 lbs/ac and those with native vegetation averaged 10,982.77 lbs/ac. The use of the traditional mixture accounted for a 59% reduction in sediments and the native mixture accounted for 58% reduction in sediments.

If all recent landings and roads (<5 years of age) were vegetated using native seed mixtures, an estimated 11.8 tons reduction in sediments from landings and 17474.7 tons from roads could be expected throughout the Upper Elk watershed.

Conclusions from this research showed that creating a proper seedbed for quick vegetation establishment is important, and current methods can be revised to work more efficiently. Therefore, vigorous establishment of vegetation on skid roads should be of top priority when timber harvesting sites are reclaimed. Using native seed mixtures for reclamation is an important consideration for the future. Forest openings created by timber harvesting can be transformed into a valuable resource for native wildlife. Sediment control using native vegetation is equal, and sometimes less than, that of traditional seeding mixtures. However, native vegetation provides better quality forage and habitat to wildlife while also maintaining native, forest biodiversity. Thus, minimizing sediments by using planted native mixtures can provide broad benefits to overall forest ecosystem.

Upper Buckhannon, Finks Run and Pecks Run – Tygart Valley River TMDL – WVMT-31, WVMTB-11 and WVMTB-5

These three watersheds have been priority watersheds since 2001. In 2006 an updated WBP was submitted and approved for the Upper Buckhannon watershed only. The agricultural component still continues but new focus has been applied to oil and gas roads after the success of 2005's Craddock Pipeline Project. Also AMD and failing septic system sources are being examined.

In 2006 BMPs were installed on agricultural operations in two of the project watersheds, those being Finks Run and Pecks Run. Through a voluntary program, administered through the Tygarts Valley Conservation District and WVCA, landowners signed up for 75% cost share monies with 25% of the cost coming from the landowner. Planning and technical assistance has been provided by the NRCS, which has developed 6 contracts in the project area, 1 in the Finks Run 5 in Pecks Run.

Agricultural practice summary of installed practices on Upper Buckhannon tributaries Pecks Run (WVMTB -5) and Finks Run (WVMTB-11)

Water Supply

- Pipeline – 1,030 feet
- Well (with pumping plant) – 1
- Pond – 1
- Watering Facility – 5

Fencing

- Use Exclusion Fence – 300 feet (to deny access to existing pond)
- Pasture Division Fence – 3,200 feet

Heavy Use Area Protection

- Heavy Use Area Protection (Roofs, gravel) – 8,040 sq. ft.

Animal Waste Storage Facility

- Manure Stacker – 1,395 sq. ft. (159 tons of manure managed) 2 Facilities

Winter Feeding Areas

- Livestock Use Area Protection – 111 sq. ft. 1 Feed Pad

Estimated Annual Load Reductions in tons/year

	Nitrogen	Phosphorus	Sediment
2006 Additional Reductions	267.1	342.3	1792.2
Project Total	560.3	719.5	2649.8

A revised and updated watershed based plan has been written by the National Mine Lands Reclamation Center at West Virginia University, with contributions from the afore mentioned agencies and organizations, and submitted for consideration that emphasizes coal mine related impairments. A study is also underway to better quantify bacterial impairments by the West Virginia Rivers Coalition. The findings of this study will help the stakeholders determine if additional plan modifications should be made and what course of action and funding should be pursued to correct the impairments.

An allocation of $61,300.00 has been designated for oil and gas related projects. A total of $19,142.00 has been spent to stabilize heavily eroded sites in the Upper Buckhannon watershed so far. This project encompasses what is known as "Shahan's Bottom" which is situated along the Left Fork of the Buckhannon River in the Palace Valley area. The project has three areas of construction.

The first part of the project was to repair approximately 4,000 linear feet of a multi-use dirt road. The scope of the project was to give the road proper drainage and limit the amount of sediment that reaches the river. Several culverts were added along with 280 tons of stone and then the banks were hydro seeded to create stability to those road banks using vegetative measures. Installing gates to deny access by any unauthorized users willl complete the project.

The second part of the project was to repair gulley erosion to a gas line right-of-way caused by unauthorized All-Terrain-Vehicles (ATV), which included a portion of the riverbank. Areas that were damaged by ATV were graded and reshaped the existing cross drains, installed more drainage ditches, seeded and mulched all denuded areas and constructing a pipe fence to deny ATV access. Then drainage controls were installed on an abandoned gas well road where sediment was being transferred directly to the river.

Natural Gas Road and Pipeline Stabilization Summary
Left Fork of the Buckhannon River HUC 05020001, WVMTB-32_00
Multi-use road:

- Annual estimated erosion - 740 tons/year
- Anticipated erosion reduction – 629 tons/year

Pipeline Stabilization:

- Estimated soil erosion– 416 tons/year
- Anticipated erosion reduction – 408 tons/year

Abandon gas well road:

- Estimated soil erosion – 55.6 tons/year
- Anticipated erosion reduction – 52.8 tons/year

Lower Cheat River – Cheat River TMDL

The Lower Cheat River has been an area of intense focus for the NPSP for several years. Last year the Friends of the Cheat (FOC) applied for and received a Targeted Watershed Initiative Grant (TWIG). That grant will focus on the Martins Creek subwatershed, a tributary to Muddy Creek. The TWIG will fund three different methods of AMD treatment to determine the most effective method. It will be a comparison of active and passive treatments. For the S319 funded projects, engineering, design and obtaining permits were the predominant activities for projects in Greens Run, Morgan Run, Muddy Creek and Pringles Run. Listed below are the projects where construction and/or monitoring occurred.

Pase Project – Pringles Run –WV MC27-B

This project was installed in October of 2004, and was efficient in reducing mine drainage for the first several months, since then, the systems performance has decreased. As a result of this decrease, NMLRC, in conjunction with WVDEP and FOC added additional treatment measures to the system. The additional treatment measures included adding a limestone leach bed above the vertical flow reactor (VFR) as well as converting the VFR into a Flushing pond and an anoxic limestone drain.

The additional treatment measures were completed in September of this year, as a result of the construction, the system is still filling with water and at this time we only have pH as an indicator of system success. A sample will be collected when the system starts flowing again.

Upper Muddy Creek (Dunn Property) – WVMC17

The table below is a comparison of pre-construction loadings versus post-construction loadings. The parameters are pH, acidity, iron, aluminum, and manganese. The table consists of the pre-construction average of the four known seeps added together and average post construction data collected at the outfall of the system.

	Pre Construction Combined Seep Avg	Post Construction System Out
Flow	237.19	92.8
pH	3.1	4
Calc Acid.	161.49	88.9
Fe	7.28	1.1
Al	15.53	13.1
Mn	5.37	4.6
Fe Load	3.8	0.22
Al Load	8.11	2.67
Mn Load	2.8	0.94
Acid Load	96.56	18.15

Reductions from the Upper Muddy Creek Project are as follows:

Acid load: 81% or 78.41 t/y
Iron load: 94% or 3.58 t/y
Aluminum load: 67% or 5.44 t/y
Manganese load: 66% or 1.86 t/y

Sovern Run – WVMC-12-0.5A

Sovern Run had two projects list as the Clark Property and the Tichnell Property. The tables below show the latest monitoring results of these projects. They are a comparison of pre-construction average loadings versus post-construction average loadings. The parameters are pH, acidity, iron, aluminum, and manganese.

Clark Property

	Pre Construction	Post Construction
Flow	481.99	73
pH	5.45	6.2
Calc Acid.	7.86	3.69
Alk	3.33	20.3
Fe	0.6	0.4
Al	0.56	0.3
Mn	1.59	0.7
Fe Load	0.64	0.06
Al Load	0.6	0.05
Mn Load	1.68	0.11
Acid Load	11.59	0.59

Reductions from the Sovern Run (Clark) Project are as follows:

Acid load: 95% or 11 t/y
Iron load: 90% or 0.58t/y
Aluminum load: 93% or 0.55 t/y
Manganese load: 95% or 1.57 t/y

Tichnell Property

Reductions from the Sovern Run (Tichnell) Project are as follows:

Acid load: 73% or 91.96 t/y
Iron load: 72% or 3.33 t/y
Aluminum load: 75% or 11.95 t/y
Manganese increased by 11% or 0.41 t/y

	Pre Construction	Post Construction
Flow	756.55	825.42
pH	3.65	5.24
Calc Acid.	75.43	18.5
Alk	0	3.6
Fe	2.78	0.71
Al	9.51	2.13
Mn	2.1	2.15
Fe Load	4.62	1.29
Al Load	15.82	3.87
Mn Load	3.49	3.90
Acid Load	125.55	33.59

Lamberts Run – West Fork TMDL – WVMW-16

Activity in the Lamberts Run projects focused on the Muzzleloader Club Project and the Oldaker Project. The Muzzleloader Club Project started construction and should be completed by the end of November with post-construction sampling to follow immediately afterward. The Oldaker Project is currently awaiting approval for permitting from the US Army Corps of Engineers. The engineering has been completed with construction anticipated for early spring.

The Muzzleloader Club Project

Long Branch – Paint Creek TMDL – WVK-65-M-1

Long Branch, a tributary of Ten Mile Fork, which flows into Paint Creek in Kanawha County, is a major source of acid and aluminum to Paint Creek. Acid mine drainage enters Long Branch from a number of collapsed portals that discharge along the steep valley walls above the stream. These acid sources account for approximately 160 tons of acid, 11.4 tons of the aluminum and 1.4 tons of the manganese entering Ten Mile Fork, a short distance upstream from its confluence with Paint Creek, each year.

Left: Limestone placement followed the natural contours and curves of the stream. *Right:* "Aluminum Falls" is the first major source of aluminum to enter Long Branch.

Long Branch is a steep narrow valley that limits most AMD treatment options because of the space needed for traditional passive treatment. It was decided that the only viable passive treatment option was to turn Long Branch into the treatment system. The original design called for a trapezoidal channel having a top width of 10 ft, a maximum depth of 3 ft and a length of 10,000 ft with 8,125 tons of limestone placed in the channel. At maximum efficiency the planned open limestone channel was expected to decrease the average acid load from 160 t/y to 2 t/y, equivalent to a 95% reduction with an estimated life of 53.3 years.

However, Long Branch is typical of many small Appalachian streams with areas of high gradient and narrow confined channels. Excavation of a trapezoidal channel was considered undesirable and unnecessary. So the limestone was to be placed in the channel in such a way as to maintain a more natural structure and function to the stream channel. Later the USCOE made this a requirement of the project's S404 permit.

Construction was completed in late September of this year with a few minor changes. Due to increased fuel prices, the channel was shaved from 10,000 feet in length down to 8000 feet and the depth of limestone went from 18" down to 10". Unfortunately this will reduce the expected lifespan of the project from 53.3 years to 25.6 years.

Sampling has shown that pH and conductivity has shown drastic improvements.

	Pre Construction	Post Construction
pH	4.8	7.5
Cond.	688	201

The results are expected to be the removal of 153 t/y of acid, 11 t/y of aluminum and 1.4 t/y of manganese from Paint Creek.

The summer's rising fuel costs caused the project to end abruptly.

Spring Creek - Little Kanawha TMDL – WVLK-31

The Spring Creek project was extended with a 2005 grant to fulfill the Program's obligation to the farmers who signed on as cooperators. Those obligations have been completed and the following practices were installed in 2006.

BMP	# INSTALLED	COVERAGE
Fencing	4	4590 ft
Pipelines	6	4590 ft
Ponds	2	0.5 acre
Well	1	
Troughs	7	
Prescribed Grazing Plans	4	325 acres
Roof Runoff Mgt Systems	11	
Water Control Structures	2	
Nutrient Mgt Plans	4	286.1 acres
Animal Use Protection	11	
Waste Storage Systems	2	

Estimated Load Reductions from BMPs

Sediment	Aluminum	Iron	Nitrogen	Phosphorus
2627 Tons	71,688 lbs/yr	16500 lbs/yr	11,064 lbs/yr	5,532 lbs/yr

Lost River – Lost River TMDL – WVPC-

The Lost River 319 Project received funding in May 2006. With the funding available efforts began to advertise the project to the landowners in the Lost River Watershed. Articles in the *Moorefield Examiner*, brochures, and posters were the first wave of informing the public.

One application has been received for assistance with failing banks along the Lost River. Survey work was done in late September. The goal is to have a project on the ground by spring 2007. In conjunction with the survey work, the working group performed a Natural Stream Restoration Monitoring profile on the site, pre-construction. This will be performed again following construction and for three to four years to monitor changes.

Landowner showing the failing bank and the location were the buffer was located the previous year.

The USDA-Natural Resources Conservation Service (NRCS) is providing assistance to many of the landowners in the Lost River Watershed. Currently NRCS reports 1,879 acres in Nutrient Management, 20.7 acres in Riparian Forest Buffers- CREP, 2 waste storage facilities have been constructed, 2 composting facilities are completed and in use, as well as 703 acres in prescribed grazing.

2007

In 2006 several projects were going through preliminary stages in preparation for implementation. As with the Lower Cheat there were efforts in Deckers Creek to prepare for future construction. To secure Watershed Cooperative Agreement Program (WCAP) grants from the Office of Surface Mining (OSM) before proceeding with the spending of S319 funds the Friends of Deckers Creek has completed one WCAP proposal for Kanes Creek South Site #1, and is working with landowners to secure rights of entry for Valley Highwall #3. These projects should go to construction in 2007.